INDIANA DEPARTMENT OF TRANSPORTATION

STANDARDS COMMITTEE MEETING AGENDA

Driving Indiana's Economic Growth

September 7, 2007

MEMORANDUM

TO: Standards Committee

FROM: Mike Milligan, Secretary

RE: Agenda for the September 20, 2007 Standards Committee Meeting

A Standards Committee meeting is scheduled for 9:00 a.m. on September 20, 2007 in the N755 Bay Window Conference Room. Please enter the meeting through the double doors directly in front of the conference room. The following agenda items are listed for consideration.

New Business

Item No.	Sponsor	Page
Item 08-4-1 211	Mr. Heustis B BORROW AND STRUCTURE BACKFILL	4
Item 08-4-2 213	Mr. Heustis FLOWABLE BACKFILL	11
Item 08-4-3 Standard Drawing	Ms. Rearick 707-BPBF-03	22
Item 08-4-4 707.07 707.09 707.12 910.01(b)7	Ms. Rearick Removal of Forms and Curing Placing Structural Members Basis of Payment Uncoated 7 Wire Strand for Prestressed Concrete	24
Item 08-4-5 Standard Drawing	Ms. Rearick 713-TCTR-04	27
Item 08-4-6 713.05 713.09 801.12(a)	Ms. Rearick Temporary Approaches Basis of Payment Temporary Pavement Marking Methods	29

Item 08-4-7 Standard Drawings	Mr. Heustis 715-BKFL-01 thru 09	30
Item 08-4-8 Standard Drawing	Ms. Rearick 715-PASD-01	41
Item 08-4-9 715.08	Ms. Rearick ~~Blank~~ *Anchor Straps and Hook Bolts*	43

cc: Committee Members (11)
FHWA (4)
ICA Representative (1)

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: The flowable backfill that is currently specified is very difficult to remove. It is also not possible to change the sand source and measuring the strength of the material is difficult.

PROPOSED SOLUTION: Revise section 213 to provide a "removable" option for flowable backfill in addition to a non-removable option. Also incorporated language enabling the supplier to change the sand source, and a method to better measure the strength of the material.
Section 211 is also revised to provide options whenever possible to the Contractors; in many instances, they have their choice to use flowable backfill, crushed stone, or structure backfill (sand).

APPLICABLE STANDARD SPECIFICATIONS: 211 & 213

APPLICABLE STANDARD DRAWINGS: None

APPLICABLE DESIGN MANUAL SECTION: Part II, Sec. 17-2.09

APPLICABLE SECTION OF GIFE: old GIFE sections 3.15 & 51; new GIFE sections 211 & 213

APPLICABLE RECURRING SPECIAL PROVISIONS: this proposal deletes RSP 213-R-446

Submitted By: Ron Heustis

Title: Manager of Construction Technical Support

Organization: INDOT

Phone Number: 317-234-2777

Date: September 6, 2007

APPLICABLE SUB-COMMITTEE ENDORSEMENT? Pipe Backfill Subcommittee. ICA and Indiana Ready Mixed Concrete Association were also provided an opportunity to review and comment.

REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 211, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

SECTION 211 – B BORROW AND STRUCTURE BACKFILL

211.01 Description

This work shall consist of backfilling excavated or displaced peat deposits; filling up to designated elevations of spaces excavated for structures and not occupied by permanent work; constructing bridge approach embankment; and filling over structures and over arches between spandrel walls, all with special material.

MATERIALS

211.02 Materials

Materials shall be in accordance with the following.

B Borrow .....As Defined*
Flowable Backfill *213*
Geotextile 918.02
Structure Backfill 904

* The material used for special filling shall be of acceptable quality, free from large or frozen lumps, wood, or other extraneous matter and shall be known as B borrow. It shall consist of suitable sand, gravel, crushed stone, ACBF, GBF, or other approved material. The material shall contain no more than 10% passing the No. 200 (75 µm) sieve and shall be otherwise suitably graded. The use of an essentially one-size material will not be permitted unless approved.

Aggregate for end bent backfill shall be No. 8 or No. 9 crushed stone or ACBF, class D or higher.

The Contractor has the option of either providing B borrow or structure backfill from an established CAPP source, or supplying the material from another source. The Contractor has the following options for supplying B borrow or structure backfill from a local site:

(a) the establishment of a CAPP Producer Yard at the local site in accordance with 917; or

(b) use a CAPP Certified Aggregate Technician or a consultant on the Department's list of approved Geotechnical Consultants For Gradation Control Testing.

For material excavated within the project limits, gradation control testing will be performed by the Department if the Contractor is directed to use the material as B borrow or as structure backfill.

The frequency of gradation control testing shall be one test per 2000 t (2000 Mg) based on production samples into a stockpile or by over the scales measurement, with a minimum of two tests per contract (one in the beginning and one near the mid-point). The sampling and testing of these materials shall be in accordance with applicable requirements of 904 for fine and coarse aggregates. The Contractor shall advise, in

writing, the Engineer and the District Materials and Testing Engineer of the plan to measure the material.

~~Where structure backfill is specified, the Contractor may substitute flowable backfill in accordance with 213. However, flowable backfill shall not be placed into or through standing water, unless approved in writing.~~

CONSTRUCTION REQUIREMENTS

211.03 General Requirements

If B borrow or structure backfill is obtained from borrow areas, the items of obtaining the areas, their locations, depths, drainage, and final finish shall be in accordance with 203.

Unless otherwise specified, if excavated material complies with 211.02 and if B borrow or structure backfill is required for special filling, the excavated material shall be used as such. If there is a surplus of this material, such surplus shall be used in embankment. The provisions of 203.19 shall apply to placing this material at structures. All surplus in excess of the directed or specified use on the right-of-way shall be disposed of in accordance with 201.03.

If fill or backfill as described in this specification is within embankment limits, and if it is not required that the entire fill or backfill be of B borrow and placed as such, then that portion above the free-water level shall be placed in accordance with applicable provisions of 203 and compacted to the required density.

If borrow is required outside the specified limits of B borrow, material in accordance with the specifications for B borrow may be furnished at the contract unit price for borrow; however, the quantity of borrow measured for payment outside the limits of structure backfill will not exceed the theoretical quantity of B borrow furnished.

Unless otherwise specified, all spaces excavated for and not occupied by bridge abutments and piers, if within embankment limits, shall be backfilled to the original ground line with B borrow, and placed in accordance with 211.04.

Where B borrow or structure backfill is required as backfill at culverts, retaining walls, sewers, manholes, catch basins, and other miscellaneous structures, it shall be compacted in accordance with 211.04.

Where specified, aggregate for end bent backfill shall be placed behind end bents and compacted in accordance with 211.04. Prior to placing the aggregate, a geotextile shall be installed in accordance with 616.11.

211.03.1 Structure Backfill Types

The structure backfill type shall be as specified.

Within each of the following structure backfill types, the Contractor shall choose from the listed options for each type.

Type 1. structure backfill in accordance with 904.05, or non-removable flowable backfill in accordance with 213.

Type 2. structure backfill in accordance with 904.03(e), or non-removable flowable backfill in accordance with 213.

Type 3. structure backfill in accordance with 904.02(h).

Type 4. removable flowable backfill in accordance with 213.

Type 5. non-removable flowable backfill in accordance with 213.

211.04 Compaction

B borrow and structure backfill *types 1, 2, and 3* shall be compacted with mechanical tamps or vibrators in accordance with the applicable provisions of 203.23 except as otherwise set out herein.

Aggregate for end bent backfill and coarse aggregate No. 8, No. 9, or No. 11 used for structure backfill shall be deposited in layers not to exceed 12 in. (300 mm) loose measurement. Each layer shall be mechanically compacted with a compactor having a plate width of 17 in. (425 mm) or larger that delivers 3000 to 9000 lb (13.3 to 40 kN) per blow. Each lift shall be compacted with two passes of the compactor.

211.05 Embankment for Bridges

When special filling is required, the embankment for bridges shall be constructed using B borrow within the specified limits shown on the plans. All embankment construction details specifically set out in this specification for embankment for bridges shall be considered in accordance with the applicable requirements of 203.

At the time B borrow is being placed for approach embankment, a well compacted watertight dam shall be constructed in level lifts, the details of which are shown on the plans. Except as hereinafter specified for material to be used in constructing the enclosing dam, and for growing vegetation, and unless otherwise provided, the material for constructing bridge approach embankment shall be B borrow compacted by mechanical methods. If approach embankment or shoulders are constructed of material not suitable for growing seed or sod, and if one or both of these is required, then such areas shall, unless otherwise specified, be covered with a layer of clay, loam, or other approved material. This layer shall be approximately 1 ft (0.3 m) thick after being compacted into place.

211.06 B Borrow Around Bents

When specified, B borrow shall be placed around all bents falling within the limits of the approach grade as shown on the plans. Before placing, the surface of the ground on which it is to be placed shall be scarified or plowed as directed. The embankment slope shall be 2:1 on the sides and beneath the structure, and shall be 6:1 from the end of the bridge down to the average ground line, or it may be required to complete the approaches back to the existing grade. An enclosing dam and provisions for growing vegetation shall be constructed in accordance with 211.05.

211.07 Blank

211.08 Spandrel Filling

Unless otherwise specified, spandrel fills for arch structures shall be composed of B borrow. The fill shall be carried up symmetrically in lifts from haunch to crown and simultaneously over all piers, abutments, and arch rings. Compaction shall be in accordance with 211.04.

211.09 Method of Measurement

B borrow, structure backfill *types 1, 2, or 3*, and aggregate for end bent backfill will be measured by the cubic yard (cubic meter) as computed from the neat line limits shown on the plans, or as adjusted. If cubic yards (cubic meters) are set out as the pay item for B borrow or structure backfill in the Schedule of Pay Items and if neat line limits are not specified for measurement of volume for the material, measurement will be made by the cubic yard (cubic meter) at the loading point in truck beds which have been measured, stenciled, and approved. The B borrow may be weighed and converted to cubic yards (cubic meters) by assuming the weight per cubic foot (mass per cubic meter) to be 90% of the maximum wet density in accordance with AASHTO T 99. The material may be cross sectioned in its original position and again after excavation is complete, and the volume computed by the average end area method. If B borrow is used for backfill in areas where unsuitable material is present or peat excavation has been performed, unless otherwise directed, the B borrow will be cross sectioned, and the volume will be computed by the average end area method.

Structure backfill types 4 or 5 will be measured in accordance with 213.08.

If the material is to be paid for by the ton (megagram), it will be weighed in accordance with 109.01(b).

If the material comes from a wet source such as below water or a washing plant, and weighing is involved in the method of measurement, there shall be a 12 h drainage period prior to the weighing.

Geotextile will be measured in accordance with 616.12.

211.10 Basis of Payment

The accepted quantities of B borrow will be paid for at the contract unit price per cubic yard (cubic meter) or per ton (megagram) as specified, complete in place.

Structure backfill *types 1, 2, or 3* will be paid for at the contract unit price per cubic yard (cubic meter), based on the neat line limits shown on the plans or as adjusted for authorized changes, provided the material comes from outside the permanent right-of-way. If the Schedule of Pay Items does not contain a pay item for structure backfill and it is required to backfill pipes or culverts within the project limits, a change order will be generated to establish a unit price. *Structure backfill type 4 or 5 will be paid for in accordance with 213.09.*

B borrow material placed outside the neat lines will be paid for as borrow when such B borrow eliminates required borrow material. Otherwise, no payment will be made for backfill material placed outside the neat lines.

Aggregate for end bent backfill will be paid for at the contract unit price per cubic yard (cubic meter), based on the neat line limits shown on the plans or as adjusted by authorized changes.

Geotextile will be paid for in accordance with 616.13.

Flowable backfill which is substituted for structure backfill will be paid for as structure backfill.

If topsoil, loam, or other suitable material in accordance with 211.05 is used for expediting the growth of seed or sod, it will be paid for at the contract unit price per cubic yard (cubic meter) for borrow, unless otherwise provided.

Payment will be made under the following:

Pay Item	**Pay Unit Symbol**
Aggregate For End Bent Backfill	CYS (m3)
B Borrow	CYS (m3)
	TON (Mg)
Structure Backfill, *Type* ____	CYS (m3)

No payment will be made under this section for material obtained within the excavation limits of the project if the Contractor is directed to use the material as B borrow or structure backfill in a pipe trench, culvert, construction of an embankment or fill, or if the Contractor uses the material for its own convenience. Material obtained from within the excavation limits of the project and which the Contractor is directed to use as B borrow or structure backfill for other purposes including replacement of undercut areas, support for a MSE wall, and end bent fill will be paid for at the contract unit price of $5.00 per cubic yard ($6.50 per cubic meter) for B borrow/structure backfill handling.

The cost of disposal of excavated material shall be included in the cost of the pay items in this section.

REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 211, CONTINUED.

Other sections containing specific cross references:

SEE NEXT PAGE

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By - Addition or Revision

Recurring Special Provisions potentially affected:

None

Standard Sheets potentially affected:

None

Motion: M
Second: M
Ayes:
Nays:

Action: Passed as submitted; revised

___ RSP Effective: _____ Letting
___ 2009 Standard Specifications Book
___ 2009 Standards Edition
___ 2008 Design Manual
___ Technical Advisory

Withdrawn ____

Received FHWA Approval? ____

OTHER SECTIONS CONTAINING SPECIFIC CROSS REFERENCES:

211.02
203.09 Pg 136
203.16(b) Pg 144
204.02 Pg 160
206.07 Pg 172
211.03 Pg 188
212.02 Pg 192
720.03 Pg 577
904.01 Pg 719

211.04
203.09 Pg 137
211.03 Pg 188
211.08 Pg 190
715.04 Pg 549
720.03 Pg 577

211.09
203.27(b) Pg 154
203.27(e) Pg 155
203.27(f) Pg 155
621.13 Pg 413
714.07 Pg 544
715.13 Pg 554
717.08 Pg 566
718.09 Pg 570
719.07 Pg 573
802.11 Pg 634

211.10
202.14 Pg 128
714.08 Pg 544
715.14 Pg 555
717.09 Pg 567
718.10 Pg 570
719.08 Pg 573
802.12 Pg 634

REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 213, BEGIN LINE 1, DELETE AND INSERT AS FOLLOWS:

SECTION 213 – FLOWABLE BACKFILL

213.01 Description

This work shall consist of placing flowable backfill in trenches for pipe structures, culverts, utility cuts, ~~and~~ other work extending under pavement locations, ~~to fill~~ cavities beneath slopewalls and other locations in accordance with 105.03.

Flowable backfill will be classified as either removable or non-removable and designated in accordance with the designations in 211.03.

MATERIALS

213.02 Materials

Materials shall be in accordance with the following:

Concrete Admixtures	912.03
Fine Aggregate~~*~~	904.*02(a)*
Fly Ash	901.02
Portland Cement	901.01(b)
Water	913.01

~~*Except that steel furnace slag shall not be used~~

~~If fly ash is used as a filler and not as a pozzolan, the fly ash shall be in accordance with 904.~~

The supplier may elect to use gradations in accordance with 904.*02(h)* or may propose the use of alternate gradations. The alternate gradation and proposed tolerances of material passing each sieve shall be included in the flowable backfill mix design, *FBMD*.

213.03 Flowable Backfill Mix Design

The Contractor shall submit a flowable backfill mix design FBMD to the ~~Engineer~~ *DMTE a minimum of seven days* ~~and arrange a~~ *prior to the* trial batch. The FBMD will be ~~approved based on compliance~~ *accepted in accordance* with 213.04. The FBMD shall be submitted in a format acceptable to the ~~Engineer~~ *DMTE* and shall include the following:

(a) a list of all ingredients
(b) the source of all materials
(c) the gradation of the aggregates
(d) the batch weight (mass) *with the aggregates at the SSD condition*
(e) the names of all admixtures
(f) the admixture dosage rates and manufacturer's recommended range
(g) identification of the flowable backfill as removable or non-removable

~~FBMD's which were used on contracts in the current or previous calendar year, may be submitted to the District Materials and Tests Engineer for approval. Effective January 1, 2004, all FBMD's shall meet the requirements of 213.05.~~

~~After the completion of the trial batch and all test results have been reviewed for compliance with the specifications, a mixture number will be assigned by the Engineer.~~

~~Mix design changes~~ *Changes in the FBMD* will not be allowed ~~after the FBMD approval,~~ except for adjustments to compensate for routine moisture fluctuations *or a change in sand source in accordance with 213.05 based on the dry flow determined from the trial batch testing.* All other changes *will* require a new FBMD.

213.04 Flowable Backfill Mix Criteria

The FBMD shall produce a workable mixture with the following properties.

~~Minimum Unconfined Compressive Strength~~
~~at 28-days ..... 50 psi (350 kPa)~~
~~Maximum Unconfined Compressive Strength~~
~~at 28-days ..... 150 psi (1050 kPa)~~
~~Minimum Fill Spread Diameter ..... 8 in. (200 mm)~~

(a) Flow Consistency

Flow consistency will be measured in accordance with ASTM D 6103. The diameter of the spread shall be at least 8 in (200 mm).

(b) Lightweight Dynamic Cone Penetration Blow Count Number

A lightweight dynamic cone penetration test will be performed in accordance with ITM 216 after the flowable backfill mix has cured for at least 72 hours. The average penetration resistance blow count number for removable flowable backfill shall not be less than 20 nor greater than 30. Flowable backfill mixes with an average penetration resistance blow count greater than 30 will be classified as non-removable.

(c) Removability Modulus

The removability modulus, RM, will be determined for the FBMD by the formula as follows:

$$RM = 0.000104(U_w)^{1.5}\sqrt{1.72N_{14} - 15.64} \qquad \textit{(English Units)}$$

$$(RM = 0.00000162(U_w)^{1.5}\sqrt{1.72N_{14} - 15.64}\,) \qquad \textit{(SI Units)}$$

Where:

N_{14} = *average lightweight dynamic cone penetration blow count after 14 days in accordance with ITM 216.*

U_w = *dry unit weight, pcf (kg/m^3), of flowable backfill after 14 days in accordance with ITM 218.*

The RM shall be 1.0 or less for removable flowable backfill.

After all test results have been reviewed for compliance with the specifications, a mixture number will be assigned by the DMTE.

213.05 Flowable Backfill Trial Batch

A trial batch shall be produced by the Contractor and *will be* tested by the ~~District Materials and Tests Engineer~~ *Department* to verify that the FBMD meets the flowable backfill mix criteria. *The Department will also determine the classification of the mix as either removable or non-removable from the results of the trial batch.* The flowable backfill shall be batched within the proportioning tolerances of 508.02(b). The ~~Engineer~~ *Department* will determine *the test results* and provide *them to* the Contractor ~~with test results for the unconfined compressive strength test and the flowable backfill spread diameter~~. The trial batch shall be of sufficient quantity to allow the ~~Contractor and the Engineer~~ *Department* to perform all required tests from the same batch. ~~Trial batch flowable backfill shall not be used for more than one test.~~

~~Compressive strength testing shall be conducted in accordance with ITM 588. Flow testing shall be conducted in accordance with ASTM D 6103.~~

~~The Contractor shall determine the penetration resistance of the flowable backfill produced during the trial batch in accordance with ITM 213 at one, three, seven, and fourteen days. The results shall be submitted to the Engineer.~~

~~FBMD's which were used on contracts in the current or previous calendar year, may be submitted to the District Materials and Tests Engineer for approval.~~

The Department will obtain a sample of the fine aggregate and fly ash described in the FBMD. The Department will test the dry flow in accordance with ITM 217 and record the results on the FBMD.

If the Contractor request<u>s</u> to change the source of the fine aggregate identified in an approved FBMD the Contractor shall submit a revised FBMD to the DMTE. The Department will obtain a sample of the new fine aggregate and, if applicable, a sample of the fly ash as identified in the approved FBMD. Dry flow will be tested in accordance with ITM 217. If the test result is within ± 2.0 s of the value shown on the approved FBMD, the revised FBMD will be approved and a new trial batch will not be required. Failure to meet the dry flow test requirement will require the Contractor to submit a new FBMD and perform a new trial batch for approval of the proposed new fine aggregate.

213.06 Mixing Equipment

The mixing equipment shall be in accordance with the applicable requirements of 702 or 722~~, except that in lieu of the calibration requirements of 722.11, the mixer operator shall make delivery in a properly calibrated continuous mixer~~.

CONSTRUCTION REQUIREMENTS

213.07 Placement

The flowable backfill shall not be placed on frozen ground. Flowable backfill shall be protected from freezing until the material has set. *Flowable backfill shall not be placed into or through standing water unless approved by the Engineer in writing.*

The diameter of the flowable backfill spread shall be at least 8 in. (200 mm) at time of placement. *Water may be adjusted from the FBMD to meet the minimum spread requirement if the initial measured spread is between 7 and 8 in. (175 and 200 mm).*

If using mixing equipment in accordance with 722, the yield will be checked using the 1/4 cu yd (0.2 m^3) box method as follows:

(a) The chute shall be cleaned and the box shall be positioned on a level surface to receive the discharged flowable backfill.

(b) The mixer shall be operated until the cement or fly ash counter indicates that 1/4 cu yd (0.2 m^3) of flowable backfill has been yielded.

(c) The contents of the box will be consolidated and struck off. If the box is not full, the gates shall be adjusted and the procedure shall be repeated until the actual and calculated volumes of flowable backfill agree.

(d) Yield will be checked on the first load of each truck and every third load per truck thereafter. Additional yield tests will be required after making any adjustments.

The flowable backfill shall be brought up uniformly to the fill line as shown on the plans or as directed. *When used as structure backfill, flowable backfill shall be placed uniformly so as not to induce unbalanced loading on any part of a structure.*

The flowable backfill shall not be subject*ed* to load nor disturbed by construction activities until *a lightweight dynamic cone* penetration *test has produced a minimum blow count* ~~resistance testing in accordance with ITM 213 has been completed~~. The minimum ~~penetration resistance~~ *blow count* shall be as follows:

~~For PCCP .....70 psi (500 kPa)~~
~~For all Other Applications..... 1200 psi (8000 kPa)~~

Construction Activities With Vibratory Compaction After Backfill.....12
Construction Activities Without Vibratory Compaction After Backfill.....7

213.08 Method of Measurement

Flowable backfill will be measured by the cubic yard (cubic meter) *of the type specified* as computed from the neat line limits shown on the plans, or as adjusted. If neat line limits are not shown on the plans, the volume in cubic yards (cubic meters) of flowable backfill furnished and placed will be computed from the nominal volume of each batch and a count of the batches. Unused and wasted flowable backfill will be estimated and deducted. Drilled holes will be measured by the number of holes drilled.

213.09 Basis of Payment

The accepted quantities of flowable backfill will be paid for at the contract unit price per cubic yard (cubic meter) *for the type specified,* furnished and placed. Holes drilled in the pavement will be paid for at the contract unit price per each.

REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 213, CONTINUED.

Payment will be made under:

Pay Item	**Pay Unit Symbol**
Drilled Hole for Flowable Backfill	EACH
Flowable Backfill, *Non-Removable*	CYS (m3)
Flowable Backfill, Removable	*CYS (m3)*

The cost of material placed outside the neat line limits, material placed outside the adjusted limits, and unused or wasted flowable backfill shall be included in the cost of this work.

Other sections containing specific cross references:

SEE NEXT PAGE

Recurring Special Provisions potentially affected:

213-R-446

Motion: M
Second: M
Ayes:
Nays:

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By - Addition or Revision

Standard Sheets potentially affected:

None

Action: Passed as submitted; revised

___ RSP Effective: _____ Letting
___ 2009 Standard Specifications Book
___ 2009 Standards Edition
___ 2008 Design Manual
___ Technical Advisory

Withdrawn ____

Received FHWA Approval? ____

OTHER SECTIONS CONTAINING SPECIFIC CROSS REFERENCES:

213.04
213.03 Pg 193

213.05
213.03 Pg 194

213.07
715.09 Pg 551

213.08
714.07 Pg 544
715.13 Pg 554
717.08 Pg 566
719.07 Pg 573

213.09
714.08 Pg 544
715.14 Pg 555
717.09 Pg 567
719.08 Pg 573

INDIANA DEPARTMENT OF TRANSPORTATION

Driving Indiana's Economic Growth

Design Memorandum No. 07-__
Technical Advisory

March 20, 2007 DRAFT

TO: **All Design, Operations, and District Personnel, and Consultants**

FROM: **_____**
Anthony L. Uremovich
Design Resources Engineer
Production Management Division

SUBJECT: **Structure Backfill**

REVISES: ***Indiana Design Manual*** **Section 17-2.9**

EFFECTIVE: **_____, 2007, Letting**

I. Structure-Backfill Types

Structure backfill has been subdivided into types. They should be specified as described below.

A. Type 1

This type should be specified for the locations as follows:

1. longitudinal or transverse structure placed under, or within 5 ft (1.5 m) of, the back of paved shoulder or back of sidewalk of a new facility, or

2. such a structure for an existing facility where all existing pavement is to be replaced.

B. Type 2

This type should be specified for the locations as follows:

1. longitudinal or transverse structure placed under, or within 5 ft (1.5 m) of, the back of paved shoulder or back of sidewalk where undisturbed existing pavement is to remain; or

2. precast-concrete three-sided or four-sided structure with height of cover of 2 ft (0.6 m) or greater.

C. Type 3

This type should be specified for use behind a mechanically stabilized earth retaining wall.

D. Type 4

This type should be specified for the locations as follows:

1. trench where a utility line is present; or

2. behind reinforced-concrete slab-bridge end bents.

E. Type 5

This type should be specified for the locations as follows:

1. precast-concrete three-sided or four-sided structure with height of cover of less than 2 ft (600 mm);

2. filling voids in an underground facility;

3. filling in an abandoned pipe or structure; or

4. any other application that does not require excavation.

II. Information to be Shown on Plans

The Structure Data sheet plan frame has been revised to include a column for structure-backfill type. If structure backfill type 4 or 5 is required, the type number should still be entered in the Type column. However, the quantity should be shown in the Flowable Backfill column. An example method of showing the backfill treatments for a structure with a utility-line intersection is shown in Figure 07-__A.

III. Backfill-Type Details

Recurring Plan Detail _____ has been revised to reflect the procedure described above, and is attached hereto.

IV. Specifications and Pay Items

Recurring Special Provision _____ is attached hereto. It, along with Recurring Plan Detail _____ should be called for as described below.

Document No. and Title	Basis for Use
211-R-534, B Borrow and Structure Backfill	Pay item for B borrow or structure backfill
714-R-535, Concrete Culverts and Retaining Walls	Pay item with *Standard Specifications* Section 714 reference number
715-R-536, Pipe Culverts and Storm and Sanitary Sewers	Pay item with *Standard Specifications* Section 715 reference number
715-R-536d, Recurring plan details for pipe-backfill methods	Pay item with *Standard Specifications* Section 211, 714, 715, 717, or723 reference number
717-R-537, Structural Plate Pipe, Pipe-Arches, and Arches	Pay item with *Standard Specifications* Section 717 reference number
904-R-538, Structure Backfill	Pay item with *Standard Specifications* Section 211, 714, 715, 717, or723 reference number

The pay item for structure backfill should always include the type. The new pay item code numbers and names are as follows. The pay unit is unchanged.

211-_____ Structure Backfill, Type 1
211-_____ Structure Backfill, Type 2
211-_____ Structure Backfill, Type 3

The pay items for structure backfill types 4 and 5 are as follows. The pay unit is unchanged.

Type 4 is 213-_____ Flowable Backfill, Removable
Type 5 is 213-_____ Flowable Backfill, Non-Removable

alu

[F:\Des\07-Bkfl-ta.doc]

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Notes which now appear on a Standard Drawing belong in the Standard Specifications

PROPOSED SOLUTION: Remove the notes from the drawing, and place them where appropriate in the Specifications

APPLICABLE STANDARD SPECIFICATIONS: 707.07, 707.09, 707.12, 910.01(b)7

APPLICABLE STANDARD DRAWINGS: 707-BPBF-03

APPLICABLE DESIGN MANUAL SECTION: none

APPLICABLE SECTION OF GIFE: none

Submitted By: Anne Rearick

Title: Structural Services Office manager

Organization: INDOT

Phone Number: 2-5156

Date: 7-27-07

Item No. 08-4-3
Ms. Rearick
Date: 9/20/07

REVISION TO STANDARD DRAWING

707-BPBF-03 Fabrication Tolerances General Notes

Other sections containing specific cross references:

None

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By - Addition or Revision

Recurring Special Provisions potentially affected:

None

Standard Sheets potentially affected:

See Above

Motion: M
Second: M
Ayes:
Nays:

Action: Passed as submitted; revised

___ RSP Effective: _____ Letting
___ 2009 Standard Specifications Book
___ 2009 Standards Edition
___ 2008 Design Manual
___ Technical Advisory

Withdrawn ____

Received FHWA Approval? ____

GENERAL NOTES :

These notes are for fabrication tolerances for precast prestressed concrete members as shown on Standard Drawing No. E 707-BPBF-01 for box beams and on Standard Drawing No. E 707-BPBF-02 for I-beams.

1. Tolerances shown are maximum permissible varations from the dimensions shown on the plans or shop drawings. Tolerances are not to be considered cumulative. Longitudinal tolerances are based on design length. Casting length shall be adjusted to compensate for shrinkage and plastic flow.

TO 707.07

2. Beams whose dimensions exceed the tolerances shown on Standard Drawing E 707-BPBF-01 or -02 will be rejected for shipment and erection.

3. For 7-wire strands, the following wire breaks will be permitted to remain on the prestressed concrete casting bed under the following conditions.

TO 910.01(b)7

Bed having:

Fewer than 20 strands, no wire breaks permitted.
20 through 39 strands, 1 wire break permitted.
40 through 59 strands, 2 wire breaks permitted.
60 or more strands, 3 wire breaks permitted.

4. The occurrence of more than the permissible number of wire breaks in a particular strand pattern, as shown above, or the occurrence of more than one broken wire in an individual strand, will require that the strand or strands be removed and replaced. All wire breaks which may occur shall be located. The ends shall be tied to the strand with wire to preclude the possibility of raveling during the vibration of the concrete.

(5) Variation of camber shall not be more than 1" on one span nor more than $\frac{1}{2}$" between adjacent beams to be measured at time of erection. Camber deviation from design camber shall not be more than ±50% if plan camber is 2" or greater or ±$\frac{1}{2}$" if plan camber is less than 1".

TO 707.09

6. A beam with a curb to be poured in the field shall have curb reinforcement located longitudinally within $\frac{3}{4}$" of the locations shown on the plans.

(7) Length of beam tolerance shall be checked after the final curing phase and within three days prior to shipping.

(8) Horizontal alignment tolerance shall be checked immediately after removal of forms and strand release and prior to removal from bed.

9. End stirrup bars shall not be more than 2" from the end of the beam.

(10) At concrete bearing area, deviation from plane surface when tested in all directions of the plane surface with a steel straightedge shall not be more than ±$\frac{1}{16}$".

11. Mild reinforcing steel concrete cover tolerance shall be $-\frac{1}{8}$" to $+\frac{3}{8}$".

TO 910.01(b)7

12. Center of gravity of prestressing strand group tolerance shall be ±$\frac{1}{4}$" and longitudinal position of handling devices ±6".

INDIANA DEPARTMENT OF TRANSPORTATION

FABRICATION TOLERANCES
GENERAL NOTES
MAY 2000

STANDARD DRAWING NO. E 707-BPBF-03

ANTHONY L. UREMOVICH REGISTERED No. 18095 STATE OF INDIANA PROFESSIONAL ENGINEER
DESIGN STANDARDS ENGINEER

/s/ Anthony L. Uremovich 5-01-00
DESIGN STANDARDS ENGINEER DATE

/s/ Firooz Zandi 5-01-00
CHIEF HIGHWAY ENGINEER DATE

REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 707, AFTER LINE 252, INSERT AS FOLLOWS:

A beam whose dimensions exceed the tolerances shown on the plans will be rejected for shipment to the project site.

SECTION 707, AFTER LINE 325, INSERT AS FOLLOWS:

A beam which is to include a field attached curb shall have curb reinforcement located longitudinally within 3/4 in. (20 mm) of the locations shown on the plans.

SECTION 707, BEGIN LINE 385, INSERT AS FOLLOWS:

No payment will be made for *removing and replacing prestressing strands due to excessive wire breakage, or* replacing precast members damaged during handling, storing, transporting, or erecting.

SECTION 910, AFTER LINE 88, INSERT AS FOLLOWS:

Wire breaks will be permitted to remain on the prestressed concrete casting bed as follows:

Number of Strands in Bed	*Wire Breaks*
19 or Fewer	*0*
20 through 39	*1*
40 through 59	*2*
60 or More	*3*

The ends of each permitted wire break shall be tied to the strand. If more than the permissible number of wire breaks appears in a particular strand pattern, or if more than one broken wire appears in an individual strand, such strands shall be removed and replaced.

The tolerance for the center of gravity for a prestressing strand group shall be ± 1/4 in. (± 6 mm). The tolerance for the longitudinal position of handling devices shall be ± 6 in. (± 150 mm).

REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 910, CONTINUED.

Other sections containing specific cross references:

707.02 Pg 490

Recurring Special Provisions potentially affected:

None

Motion: M
Second: M
Ayes:
Nays:

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By - Addition or Revision

Standard Sheets potentially affected:

707-BPBF-03

Action: Passed as submitted; revised

___ RSP Effective: _____ Letting
___ 2009 Standard Specifications Book
___ 2009 Standards Edition
___ 2008 Design Manual
___ Technical Advisory

Withdrawn ____

Received FHWA Approval? ____

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Notes which now appear on a Standard Drawing belong in the Standard Specifications

PROPOSED SOLUTION: Remove the notes from the drawing, and place them where appropriate in the Specifications

APPLICABLE STANDARD SPECIFICATIONS: 713.05, 713.09, 801.12(a)

APPLICABLE STANDARD DRAWINGS: 713-TCTR-04

APPLICABLE DESIGN MANUAL SECTION: none

APPLICABLE SECTION OF GIFE: none

Submitted By: Anne Rearick

Title: Structural Services Office manager

Organization: INDOT

Phone Number: 2-5156

Date: 7-27-07

Item No. 08-4-5
Ms. Rearick
Date: 9/20/07

REVISION TO STANDARD DRAWING

713-TCTR-04 Temporary Runaround General Notes

Other sections containing specific cross references:

None

Recurring Special Provisions potentially affected:

None

Motion: M
Second: M
Ayes:
Nays:

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By - Addition or Revision

Standard Sheets potentially affected:

See Above

Action: Passed as submitted; revised

___ RSP Effective: _____ Letting
___ 2009 Standard Specifications Book
___ 2009 Standards Edition
___ 2008 Design Manual
___ Technical Advisory

Withdrawn ____

Received FHWA Approval? ____

GENERAL NOTES

1. The pavement section for traffic volumes or percent trucks exceeding the values shown in (S) in the Legend shall be as shown elsewhere in the plans.
2. The surface course shall be placed when the runaround is in service between December 1 and the following April 1.
3. A temporary bridge or temporary pipe shall be used as specified. A 28'-0 clear roadway width shall be provided on a temporary bridge.
4. The connection of the temporary runaround to the existing pavement shall be outside the limits of the approach pavement removal.
5. Temporary pavement markings will be required as shown. The contractor shall have the option of using temporary tape or paint for all temporary pavement markings except where otherwise specified.
6. Delineators type D-2 (white) shall be placed at 30 ft maximum spacing on both sides throughout the length of the temporary runaround, including across the temporary structure. If a temporary bridge is used, type 3 object markers shall be placed at all four corners in accordance with the MUTCD.
7. Spacing of drums at this location shall be 20 ft.
8. If the runaround posted speed limit is greater than 30 mph the reverse curve sign, XW1-4-A, shall be used at this location.
   If the runaround posted advisory speed limit is 30 mph or less, the reverse turn sign, XW1-3-A shall be used.

LEGEND

- Delineator type D-2 (white)

(S) Pavement section for ADT ∠ 4500 and maximum of 10% trucks shall be:
140#/yd² HMA Surface 9.5 mm
630#/yd² HMA intermediate 19.0 mm
6 in. compacted aggregate base, size No. 53
(See Genaral Notes 1 and 2.)

INDIANA DEPARTMENT OF TRANSPORTATION	
TEMPORARY RUNAROUND GENERAL NOTES JANUARY 1999	
STANDARD DRAWING NO. E 713-TCTR-04	
ANTHONY L. URCHOVICH REGISTERED No. 18095 STATE OF INDIANA PROFESSIONAL ENGINEER DESIGN STANDARDS ENGINEER	DETAILS PLACED IN THIS FORMAT 11-15-99 /s/ Anthony L. Uremovich 11-15-99 DESIGN STANDARDS ENGINEER — DATE /s/ Firooz Zandi 11-15-99 CHIEF HIGHWAY ENGINEER — DATE ORIGNALLY APPROVED 1-04-99

Item No. 08-4-6
Ms. Rearick
Date: 9/20/07

REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 713, BEGIN LINE 45, INSERT AS FOLLOWS:

713.05 Temporary Approaches

Temporary approaches shall be constructed to a line and grade which will provide a reasonably convenient and safe connection between the temporary bridge and the existing road. The grade and crown elevation shall be as shown on the plans. The roadway and slopes shall be as shown on the plans. All necessary drainage shall be provided. Embankment shall be compacted in accordance with 203. *The connection of the temporary runaround to the existing pavement shall be outside the limits of the approach pavement removal.* If it becomes necessary to reconstruct the connection of the approaches with the existing roadway, either because of the operations or other cause, such adjustment shall be made as directed. HMA pavement for temporary approaches shall be in accordance with 402. *A surface course shall be placed if the runaround is to be in use beginning December 1 through the following March 31.* Temporary pavement markings in accordance with 801.12 shall be placed as shown on the plans. Delineators in accordance with 804 shall be placed as shown on the plans.

SECTION 713, BEGIN LINE 96, INSERT AS FOLLOWS:

specified. HMA mixtures for temporary pavement, *including surface course required for winter runaround use,* will be paid for as the type of mixture specified, in accordance with 610.06, complete in place. Guardrail installed

SECTION 801, BEGIN LINE 586, INSERT AS FOLLOWS:

(a) Temporary Pavement Marking Methods

Pavement markings shall be installed in accordance with 808.07.

The Contractor will be permitted to use either paint or tape for all temporary runaround markings unless otherwise directed.

Other sections containing specific cross references:

None

Recurring Special Provisions potentially affected:

None

Motion: M
Second: M
Ayes:
Nays:

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By - Addition or Revision

Standard Sheets potentially affected:

713-TCTR-04

Action: Passed as submitted; revised

___ RSP Effective: _____ Letting
___ 2009 Standard Specifications Book
___ 2009 Standards Edition
___ 2008 Design Manual
___ Technical Advisory

Withdrawn ____

Received FHWA Approval? ____

Item No. 08-4-7
Mr. Heustis
Date: 9/20/07

REVISION TO STANDARD DRAWINGS

715-BKFL-01 Pipe Backfill Method 1 New Roadway, Trench
715-BKFL-02 Pipe Backfill Method 1 New Roadway, Embankment
715-BKFL-03 Pipe Backfill Method 1 Existing Roadway, Trench
715-BKFL-04 Pipe Backfill Method 1 Existing Roadway, Trench
715-BKFL-05 Pipe Backfill Method 1 Existing Roadway, Trench
715-BKFL-06 Pipe Backfill Method 2 Class II, IV, V, and VI Drives, Trench
715-BKFL-07 Pipe Backfill Method 2 Class II, IV, V, and VI Drives, Embankment
715-BKFL-08 Pipe Backfill Method 3 Median Installation, Trench
715-BKFL-09 Pipe Backfill Method 1 Median Installation, Embankment

Other sections containing specific cross references:

None

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By - Addition or Revision

Recurring Special Provisions potentially affected:

None

Standard Sheets potentially affected:

See Above

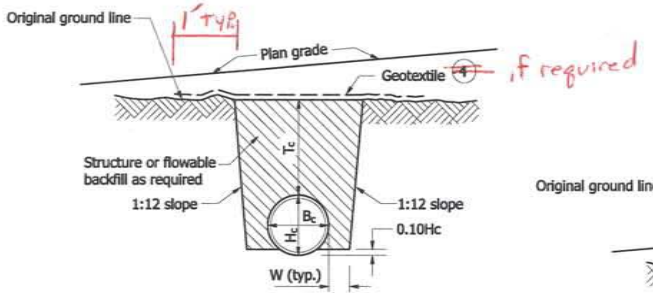
Motion: M
Second: M
Ayes:
Nays:

Action: Passed as submitted; revised

___ RSP Effective: _____ Letting
___ 2009 Standard Specifications Book
___ 2009 Standards Edition
___ 2008 Design Manual
___ Technical Advisory

Withdrawn ____

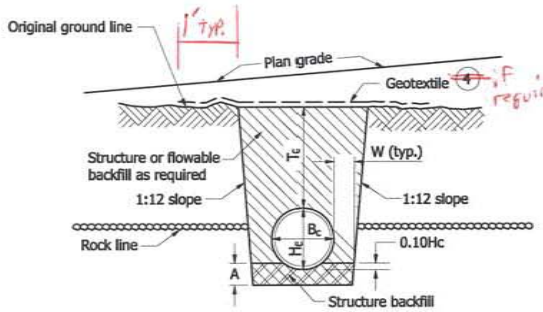
Received FHWA Approval? ____



SECTION A-A

LEGEND

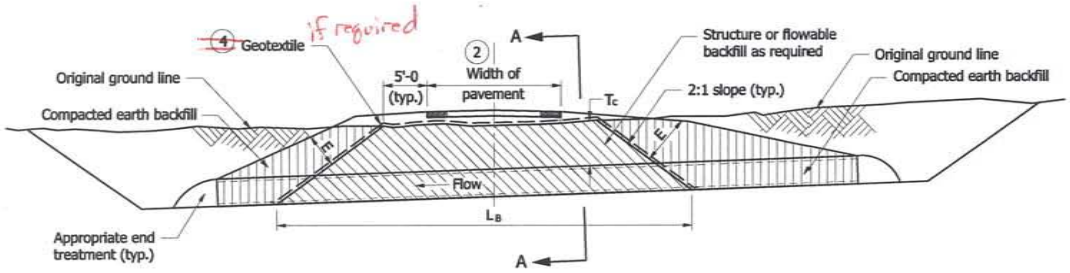
H_c = Overall diameter or rise (typ.)
B_c = Overall diameter or span
A = 8" min. for fill height less than 16'
= 12" min. for fill height of 16' or more
T_c = Trench cover depth over pipe
W = 0.3 B_c or 9", whichever is greater
E = Encasement
L_B = Backfill length measured from toe to toe of the 2:1 slopes.



SECTION A-A
ROCK FOUNDATION

NOTES :

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
   a.) 1.5' for $B_c \leq 18"$
   b.) 3' for $18" < B_c \leq 54"$
   c.) 4' for $B_c > 54"$
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. Flowable or structure backfill shall be encased by compacted earth backfill. The minimum encasement shall be 2 ft. If necessary, the 2:1 slope between the flowable or structure backfill and the encasement shall be modified to maintain the minimum 2 ft encasement.
4. ~~Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.~~



ELEVATION

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1
NEW ROADWAY, TRENCH

SEPTEMBER 2007

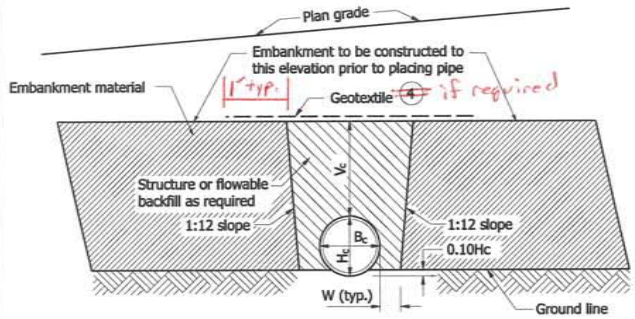
STANDARD DRAWING NO. E 715-BKFL-01

RICHARD L. VanCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER

DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/04/07
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/04/07
CHIEF HIGHWAY ENGINEER DATE



SECTION B-B

LEGEND

H_c = Overall diameter or rise (typ.)

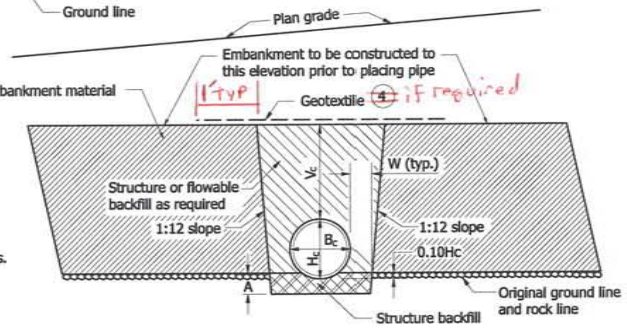
B_c = Overall diameter or span

A = 8" min. for fill height less than 16'
= 12" min. for fill height of 16' or more

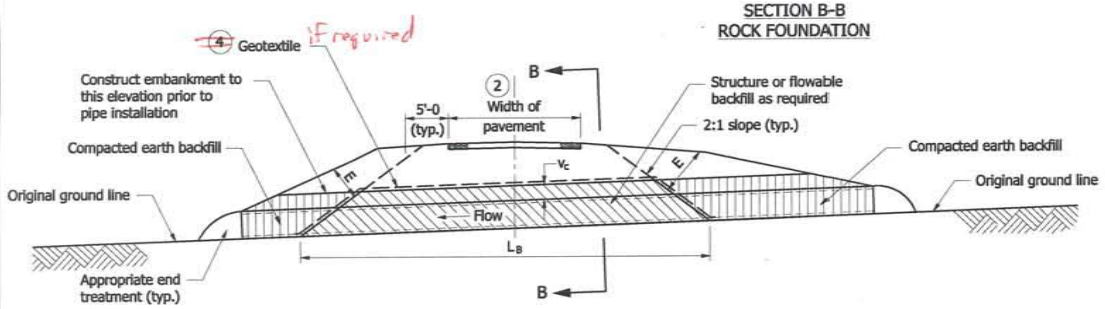
V_c = 12" for $B_c \leq 18"$
18" for $B_c > 18"$

W = 0.3 B_c or 9", whichever is greater

L_B = Backfill length measured from toe to toe of the 2:1 slopes.



SECTION B-B
ROCK FOUNDATION



ELEVATION

NOTES :

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
   a.) 1.5' for $B_c \leq 18"$
   b.) 3' for $18" < B_c \leq 54"$
   c.) 4' for $B_c > 54"$
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. Flowable or structure backfill shall be encased by compacted earth backfill. The minimum encasement shall be 2 ft. If necessary, the 2:1 slope between the flowable or structure backfill and the encasement shall be modified to maintain the minimum 2 ft encasement.
4. ~~Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.~~

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1
NEW ROADWAY, EMBANKMENT

SEPTEMBER 2007

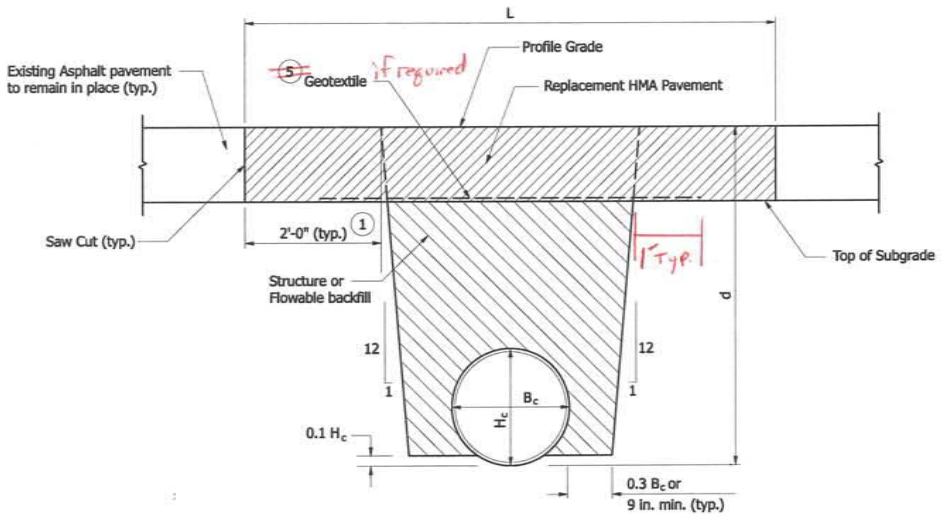
STANDARD DRAWING NO. E 715-BKFL-02

RICHARD L. VanCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER

DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/04/07
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/04/07
CHIEF HIGHWAY ENGINEER DATE



L = Pay limits of pavement removal and pavement replacement (ft); for cross pipe, measured along roadway centerline; for pipe parallel to roadway centerline, measured prependicular to pipe centerline.

B_C = Overall diameter or span (in.)

H_C = Overall diameter or rise (in.)

d = Vertical distance from flowline to profile grade (ft)

ASPHALT REPLACEMENT PAVEMENT

NOTES :

1. Existing subgrade over this distance shall remain in place.
2. The minimum pavement sections shall be as follows:
   HMA: 165 #/syd HMA Surface, Type A,B,C or D on variable HMA Intermediate, Type A, B, C or D
3. If underdrains are present, they shall be perpetuated in accordance with the details shown on Standared Drawing E 718-UNDR-01.
4. See Standard Drawing E 715-BKFL-01 for pipe backfill trench elevation view.
5. ~~Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench.~~

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1
EXISTING ROADWAY, TRENCH

SEPTEMBER 2007

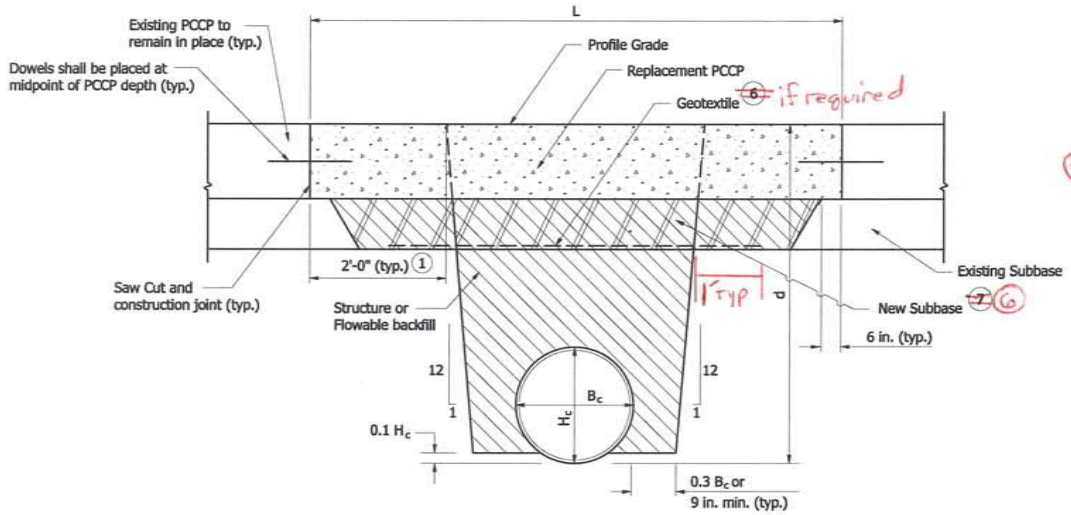
STANDARD DRAWING NO. E 715-BKFL-03

RICHARD L. VanCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER

DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/04/07
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/04/07
CHIEF HIGHWAY ENGINEER DATE



L = Pay limits of pavement removal and pavement replacement (ft); for cross pipe, measured along roadway centerline; for pipe parallel to roadway centerline, measured prependicular to pipe centerline.

B_C = Overall diameter or span (in.)

H_C = Overall diameter or rise (in.)

d = Vertical distance from flowline to profile grade (ft)

PCCP REPLACEMENT PAVEMENT

NOTES :

1. Existing subgrade over this longitudinal distance shall remain in place.
2. The thickness of the replacement PCCP shall match that of the existing concrete pavement.
3. See Standard Drawing E 506-CCPP-01 for subbase, dowels, and construction joint details.
4. If underdrains are present, they shall be perpetuated in accordance with the details shown on Standard Drawing E 718-UNDR-01.
5. See Standard Drawing E 715-BKFL-01 for pipe backfill trench elevation view.
6. ~~Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench.~~
7. New subbase type shall match the existing subbase type and thickness.

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL, METHOD 1 EXISTING ROADWAY, TRENCH

SEPTEMBER 2007

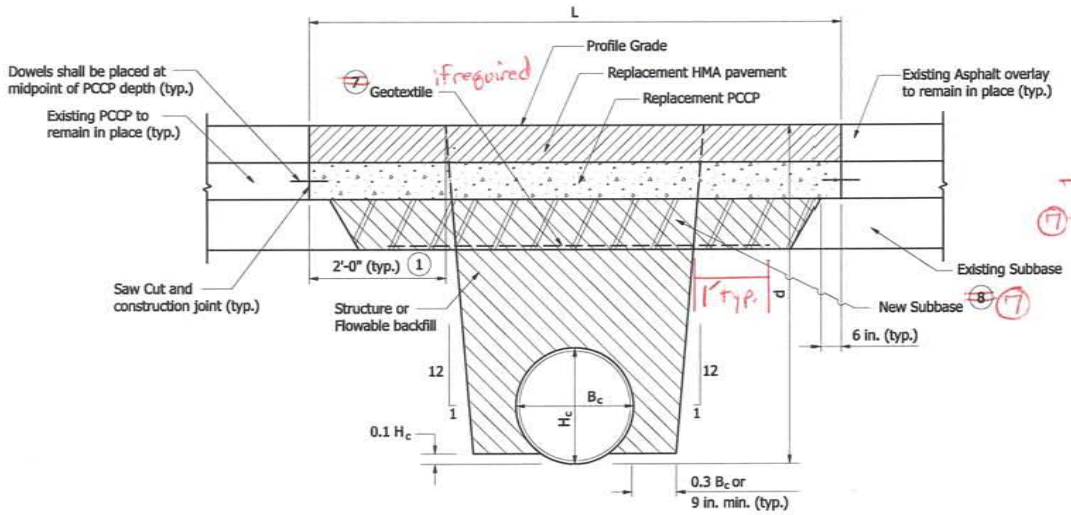
STANDARD DRAWING NO. E 715-BKFL-04

RICHARD L. VanCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER

DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/04/07
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/04/07
CHIEF HIGHWAY ENGINEER DATE



L = Pay limits of pavement removal and pavement replacement (ft); for cross pipe, measured along roadway centerline; for pipe parallel to roadway centerline, measured prependicular to pipe centerline.

B_C = Overall diameter or span (in.)

H_C = Overall diameter or rise (in.)

d = Vertical distance from flowline to profile grade (ft)

COMPOSITE REPLACEMENT PAVEMENT

NOTES :

1. Existing subgrade over this distance shall remain in place.
2. The thickness of the replacement PCCP shall match that of the existing concrete pavement.
3. The minimum pavement sections shall be as follows:
   HMA: 165 #/syd HMA Surface, Type A,B,C or D on variable HMA Intermediate, Type A, B, C or D
4. See Standard Drawing E 506-CCPP-01 for subbase, dowels, and construction joint details.
5. If underdrains are present, they shall be perpetuated in accordance with the details shown on Standard Drawing E 718-UNDR-01.
6. See Standard Drawing E 715-BKFL-01 for pipe backfill trench elevation view.
7. ~~Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench.~~
8. New subbase type shall match the existing subbase type and thickness.

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1
EXISTING ROADWAY, TRENCH

SEPTEMBER 2007

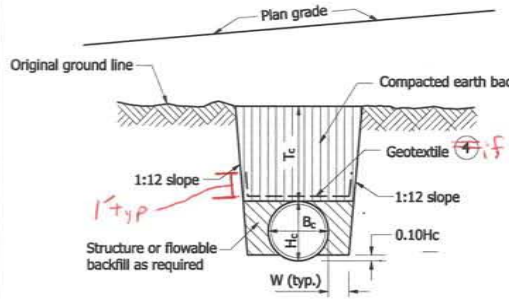
STANDARD DRAWING NO. E 715-BKFL-05

RICHARD L. VanCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER

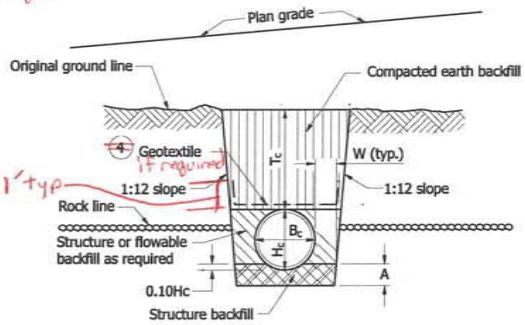
DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/04/07
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/04/07
CHIEF HIGHWAY ENGINEER DATE



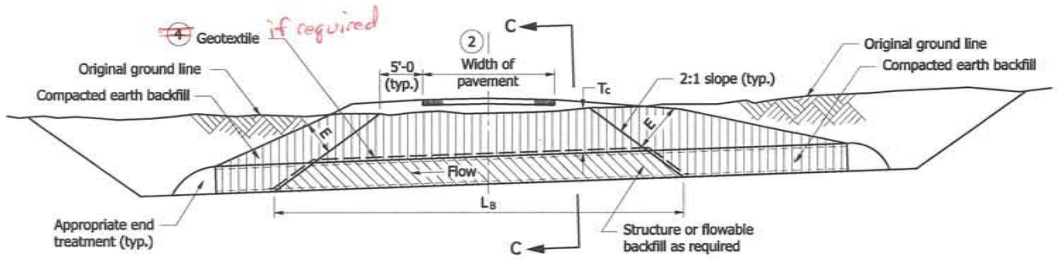
SECTION C-C



SECTION C-C
ROCK FOUNDATION

LEGEND

H_c = Overall diameter or rise (typ.)
B_c = Overall diameter or span
A = 8" min. for fill height less than 16'
= 12" min. for fill height of 16' or more
T_c = Trench cover depth over pipe
W = 0.3 B_c or 9", whichever is greater
E = Encasement
L_B = Backfill length measured from toe to toe of the 2:1 slopes.



ELEVATION

NOTES :

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
   a.) 1.5' for $B_c \leq 18"$
   b.) 3' for $18" < B_c \leq 54"$
   c.) 4' for $B_c > 54"$
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. Flowable or structure backfill shall be encased by compacted earth backfill. The minimum encasement shall be 2 ft. If necessary, the 2:1 slope between the flowable or structure backfill and the encasement shall be modified to maintain the minimum 2 ft encasement.
4. ~~Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.~~

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 2
CLASS II, IV, V AND VI DRIVES, TRENCH

SEPTEMBER 2007

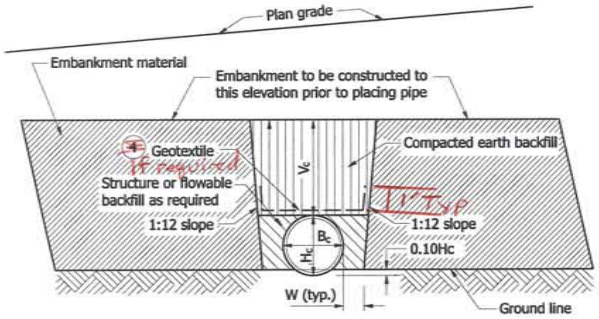
STANDARD DRAWING NO. E 715-BKFL-06

RICHARD L. VanCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER

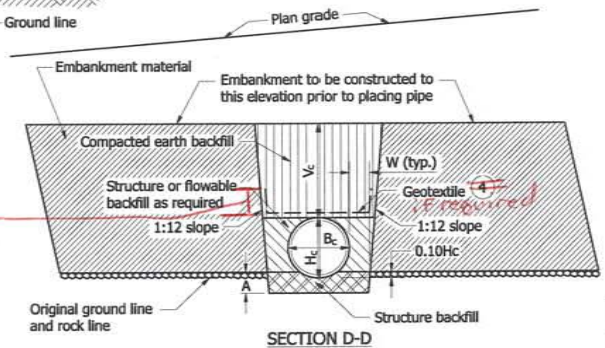
DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/04/07
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/04/07
CHIEF HIGHWAY ENGINEER DATE



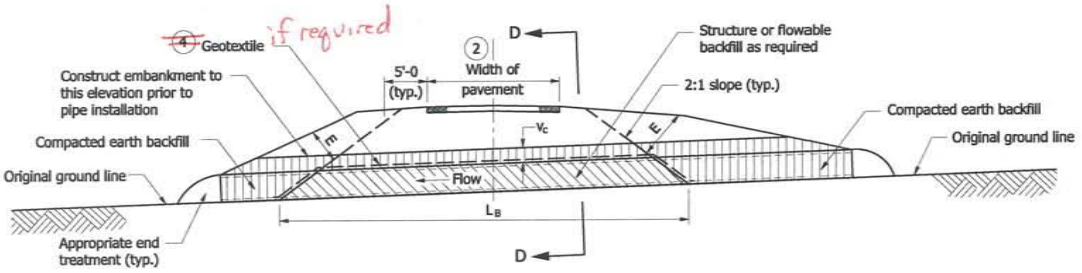
SECTION D-D



SECTION D-D
ROCK FOUNDATION

LEGEND

- H_c = Overall diameter or rise (typ.)
- B_c = Overall diameter or span
- A = 8" min. for fill height less than 16'
  = 12" min. for fill height of 16' or more
- V_c = 12" for $B_c \leq 18$"
  18" for $B_c > 18$"
- W = 0.3 B_c or 9", whichever is greater
- E = Encasement
- L_B = Backfill length measured from toe to toe of the 2:1 slopes.



ELEVATION

NOTES :

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
   a.) 1.5' for $B_c \leq 18$"
   b.) 3' for 18" < $B_c \leq 54$"
   c.) 4' for $B_c > 54$"
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. Flowable or structure backfill shall be encased by compacted earth backfill. The minimum encasement shall be 2 ft. If necessary, the 2:1 slope between the flowable or structure backfill and the encasement shall be modified to maintain the minimum 2 ft encasement.
4. ~~Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.~~

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 2
CLASS II, IV, V AND VI DRIVES, EMBANKMENT

SEPTEMBER 2007

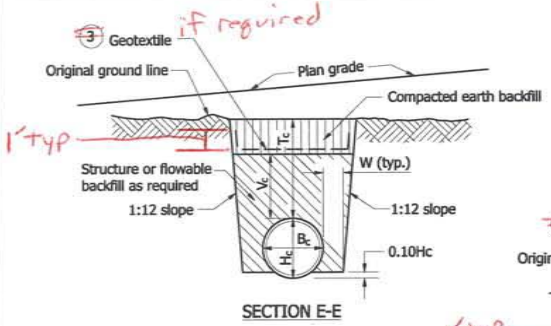
STANDARD DRAWING NO. E 715-BKFL-07

RICHARD L. VanCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER

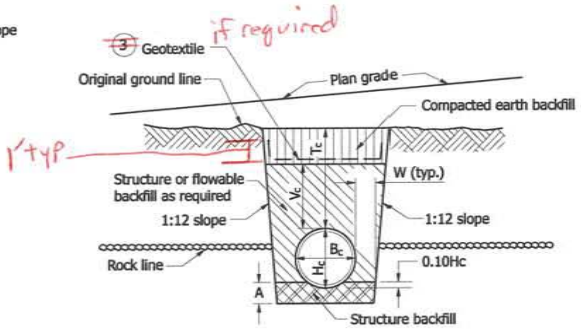
DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/04/07
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/04/07
CHIEF HIGHWAY ENGINEER DATE



SECTION E-E



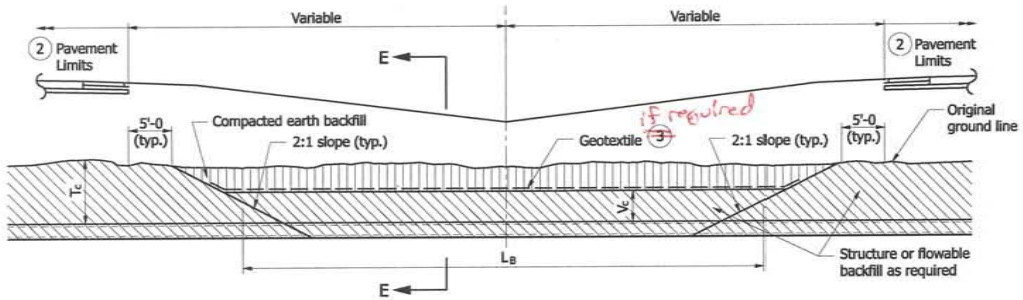
SECTION E-E
ROCK FOUNDATION

LEGEND

H_c = Overall diameter or rise (typ.)
B_c = Overall diameter or span
A = 8" min. for fill height less than 16'
= 12" min. for fill height of 16' or more
V_c = 12" for $B_c \leq 18$"
18" for $B_c > 18$"
T_c = Trench cover depth over pipe
W = 0.3 B_c or 9", whichever is greater
L_B = Backfill length measured from toe to toe of the 2:1 slopes.

NOTES :

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
   a.) 1.5' for $B_c \leq 18$"
   b.) 3' for 18" < $B_c \leq 54$"
   c.) 4' for $B_c > 54$"
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. ~~Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.~~



ELEVATION THRU MEDIAN STRIP

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 3
MEDIAN INSTALLATION, TRENCH

SEPTEMBER 2007

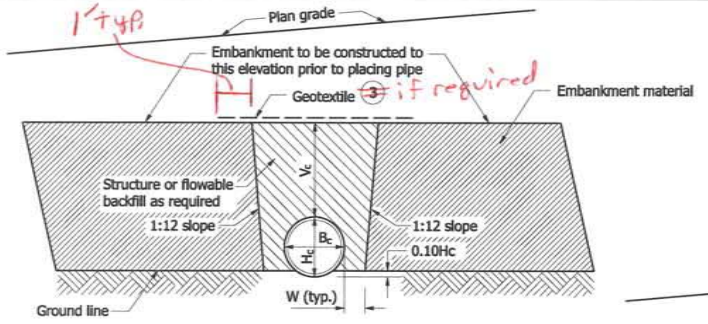
STANDARD DRAWING NO. E 715-BKFL-08

RICHARD L. VanCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER

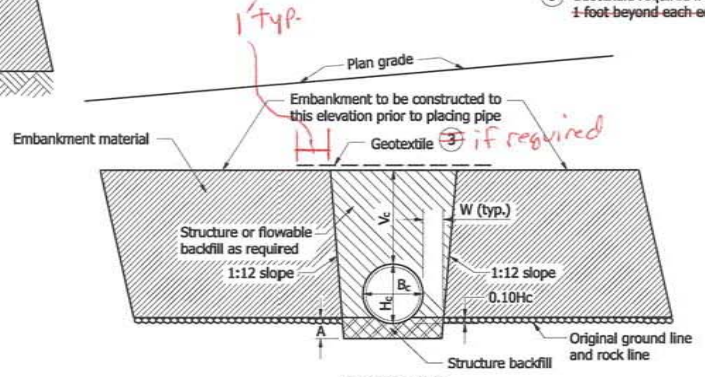
DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/04/07
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/04/07
CHIEF HIGHWAY ENGINEER DATE



SECTION F-F



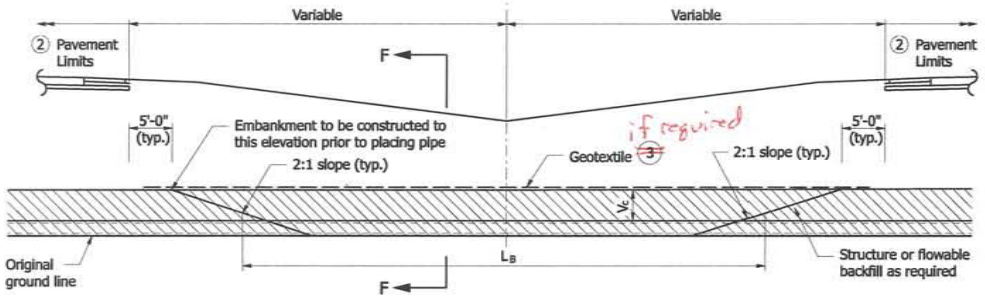
SECTION F-F
ROCK FOUNDATION

LEGEND

- H_c = Overall diameter or rise (typ.)
- B_c = Overall diameter or span
- A = 8" min. for fill height less than 16'
  = 12" min. for fill height of 16' or more
- V_c = 12" for $B_c \leq 18$"
  18" for $B_c > 18$"
- W = 0.3 B_c or 9", whichever is greater
- L_B = Backfill length measured from toe to toe of the 2:1 slopes.

NOTES :

1. Protective cover shall be constructed prior to running heavy equipment over installed pipes. The minimum covers are listed below:
   a.) 1.5' for $B_c \leq 18$"
   b.) 3' for 18" < $B_c \leq 54$"
   c.) 4' for $B_c > 54$"
2. For backfill purposes, paved shoulders, curbs, and sidewalks are considered pavement. See Standard Drawing E 715-BKFL-10 for pavement limits when curbs, paved shoulders, or sidewalks are present.
3. ~~Geotextile required if coarse aggregate is used. Geotextile should extend 1 foot beyond each edge of the excavated trench or toe of slope.~~



ELEVATION THRU MEDIAN STRIP

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE BACKFILL METHOD 1
MEDIAN INSTALLATION, EMBANKMENT

SEPTEMBER 2007

STANDARD DRAWING NO. E 715-BKFL-09

RICHARD L. VANCLEAVE REGISTERED No. 9750 STATE OF INDIANA PROFESSIONAL ENGINEER

DESIGN STANDARDS ENGINEER

/s/ Richard L. VanCleave 09/04/07
DESIGN STANDARDS ENGINEER DATE

/s/ Mark A. Miller 09/04/07
CHIEF HIGHWAY ENGINEER DATE

PROPOSAL TO STANDARDS COMMITTEE

PROBLEM(S) ENCOUNTERED: Notes which now appear on a Standard Drawing either belong in the Standard Specifications, or should be deleted

PROPOSED SOLUTION: Remove the notes from the drawing, and place the appropriate ones in the Specifications

APPLICABLE STANDARD SPECIFICATIONS: New section 715.08

APPLICABLE STANDARD DRAWINGS: 715-PASD-01

APPLICABLE DESIGN MANUAL SECTION: none

APPLICABLE SECTION OF GIFE: none

Submitted By: Anne Rearick

Title: Structural Services Office manager

Organization: INDOT

Phone Number: 2-5156

Date: 7-27-07

Item No. 08-4-8
Ms. Rearick
Date: 9/20/07

REVISION TO STANDARD DRAWING

715-PASD-01 Pipe Anchor Strap Details

Other sections containing specific cross references:

None

Recurring Special Provisions potentially affected:

None

Motion: M
Second: M
Ayes:
Nays:

General Instructions to Field Employees
Update Required? Y___ N___
By - Addition or Revision
Frequency Manual
Update Required? Y___ N___
By - Addition or Revision

Standard Sheets potentially affected:

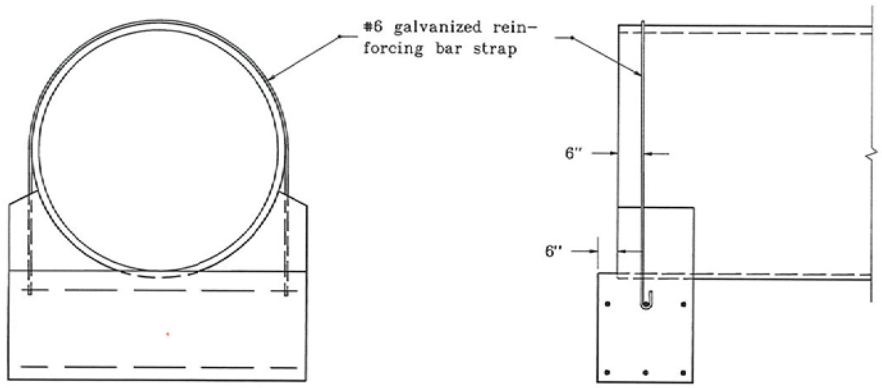
See Above

Action: Passed as submitted; revised

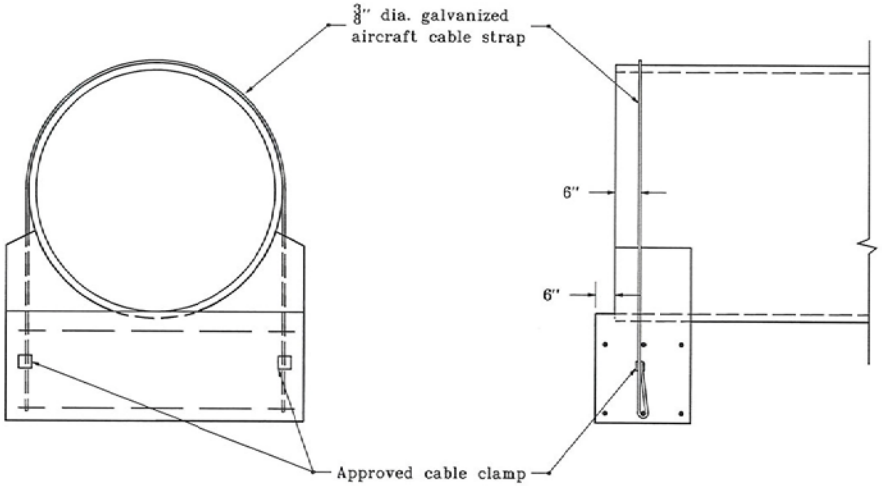
___ RSP Effective: _____ Letting
___ 2009 Standard Specifications Book
___ 2009 Standards Edition
___ 2008 Design Manual
___ Technical Advisory

Withdrawn _____

Received FHWA Approval? _____



#6 REINFORCING BAR STRAP DETAILS



3/8" AIRCRAFT CABLE STRAP DETAILS

GENERAL NOTES

TO 715.08

1. Anchor straps shall be used at both upstream and downstream ends of all C.A., C.S., and structural plate pipes and pipe arches with a diameter or span of 42" or greater.
2. Hook bolts and anchor straps shall be used at both upstream and downstream ends of all C.A., C.S., and structural plate pipes and pipe arches with a diameter or span of 84" or greater.
3. See Standard Drawing E 715-PAHB-01 for hook bolt details.

DELETE NOTE

4. Riprap shall be placed at the ends of pipe structures when shown on the plans.

INDIANA DEPARTMENT OF TRANSPORTATION

PIPE ANCHOR
STRAP DETAILS
JANUARY 1998

STANDARD DRAWING NO. E 715-PASD-01

ANTHONY L. URKOVICH REGISTERED No. 18095 STATE OF INDIANA PROFESSIONAL ENGINEER
DESIGN STANDARDS ENGINEER

DETAILS PLACED IN THIS FORMAT 7-27-99

/s/ Anthony L. Urkovich 7-27-99
DESIGN STANDARDS ENGINEER DATE

/s/ Firooz Zandi 7-27-99
CHIEF HIGHWAY ENGINEER DATE
ORIGINALLY APPROVED 1-02-98

Item No. 08-4-9
Ms. Rearick
Date: 9/20/07

REVISION TO 2008 STANDARD SPECIFICATIONS

SECTION 715, BEGIN LINE 303, DELETE AND INSERT AS FOLLOWS:

715.08 ~~Blank~~ *Anchor Straps and Hook Bolts*

Anchor straps shall be placed at both the upstream and downstream end of each corrugated aluminum alloy, corrugated steel, or structural plate pipe or pipe-arch with a diameter or span of 42 in. (1050 mm) or greater.

Hook bolts and anchor straps shall be placed at both the upstream and downstream end of each corrugated aluminum alloy, corrugated steel, or structural plate pipe or pipe-arch with a diameter or span of 84 in. (2100 mm) or greater.

Other sections containing specific cross references: None	General Instructions to Field Employees Update Required? Y___ N___ By - Addition or Revision Frequency Manual Update Required? Y___ N___ By - Addition or Revision
Recurring Special Provisions potentially affected: None	Standard Sheets potentially affected: 715-PASD-01
Motion: M Second: M Ayes: Nays:	Action: Passed as submitted; revised ___ RSP Effective: _____ Letting ___ 2009 Standard Specifications Book ___ 2009 Standards Edition ___ 2008 Design Manual ___ Technical Advisory Withdrawn ____ Received FHWA Approval? ____